OVID: A Graphical User Interface Tool for Visualizing Opacities

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Opacity Visualization in Detail (OVID) is an opacity visualization tool built in the IDL (interactive data language) environment and designed to investigate the various physical quantities output from opacity codes. Used by the T-4 group at Los Alamos National Laboratory, it is an easy-to-use yet sophisticated tool for "diagnosing" opacity tables. A graphical user interface with multiple tabs provides a large workspace to study 3-D surfaces and 2-D images of opacities, densities, pressures, and other quantities. In addition, spectra associated with each table point can be examined, and ion populations can be viewed.

The main goal of OVID is to provide a robust and straightforward method for surveying the large quantities of data that result from opacity codes. It has been designed with a special extensible markup language (XML) package that allows the investigation of a wide range of codes. Users wishing to survey data from a particular code need only build a parser to make their output conform to a specific format which is readable by the OVID XML parser. Within OVID, the data is then converted into a single hierarchical data format (HDF) file for the scalar data, which are the physical quantities such as opacities that can be viewed in 3-D on a universal grid of η (degeneracy parameter μ/k_BT) and θ (k_BT). A separate HDF file is created for the spectral data. These HDF files maintain a strict organization of the data in array format.

OVID has seven tabbed windows that promote the study of different aspects of the data. The main window, Tab 1, acts as the driving engine, where data sets can be selected and viewed in a 3-D rotating object graphics plot. Figure 1 shows an example of the main window and a Rosseland opacity 3-D surface from an ATOMIC code run for oxygen. The second tab allows the capability to compare two codes, in which case 3-D rotating plots of data from both codes are available and the percent difference between the two codes is shown in the main plot on Tab 1. The third tab allows a simple 2-D image visualization of the data chosen in the main window. Tab 4 allows the user to select iso-η and iso-θ curves and display them in a 2-D representation survey environment, while Tab 5 provides a larger view of selected 2-D graphs from the fourth tab. In Tab 6, the total and fractional ion populations can be displayed on a 2-D plot for chosen table points. The final window, Tab 7, displays spectral contributions for chosen table points. In all windows, buttons are available for printing 2-D and 3-D images and surfaces to either encapsulated postscript (EPS) or bitmap (BMP) files.

One of the major benefits of OVID is that it can be run with IDL's new Virtual Machine™ (VM). Anyone can download IDL-VM for free from the web in Windows, Linux, UNIX, or Mac versions. Running OVID with IDL-VM allows all the capability of the tool without having to worry about compiling or interacting with the code, and also makes it possible for users without IDL licenses to benefit from OVID.

OVID has been fully documented in a help file which details all aspects of the code, from setting up data according to OVID's specified format and creating XML files to interacting with each window of the graphical user interface.

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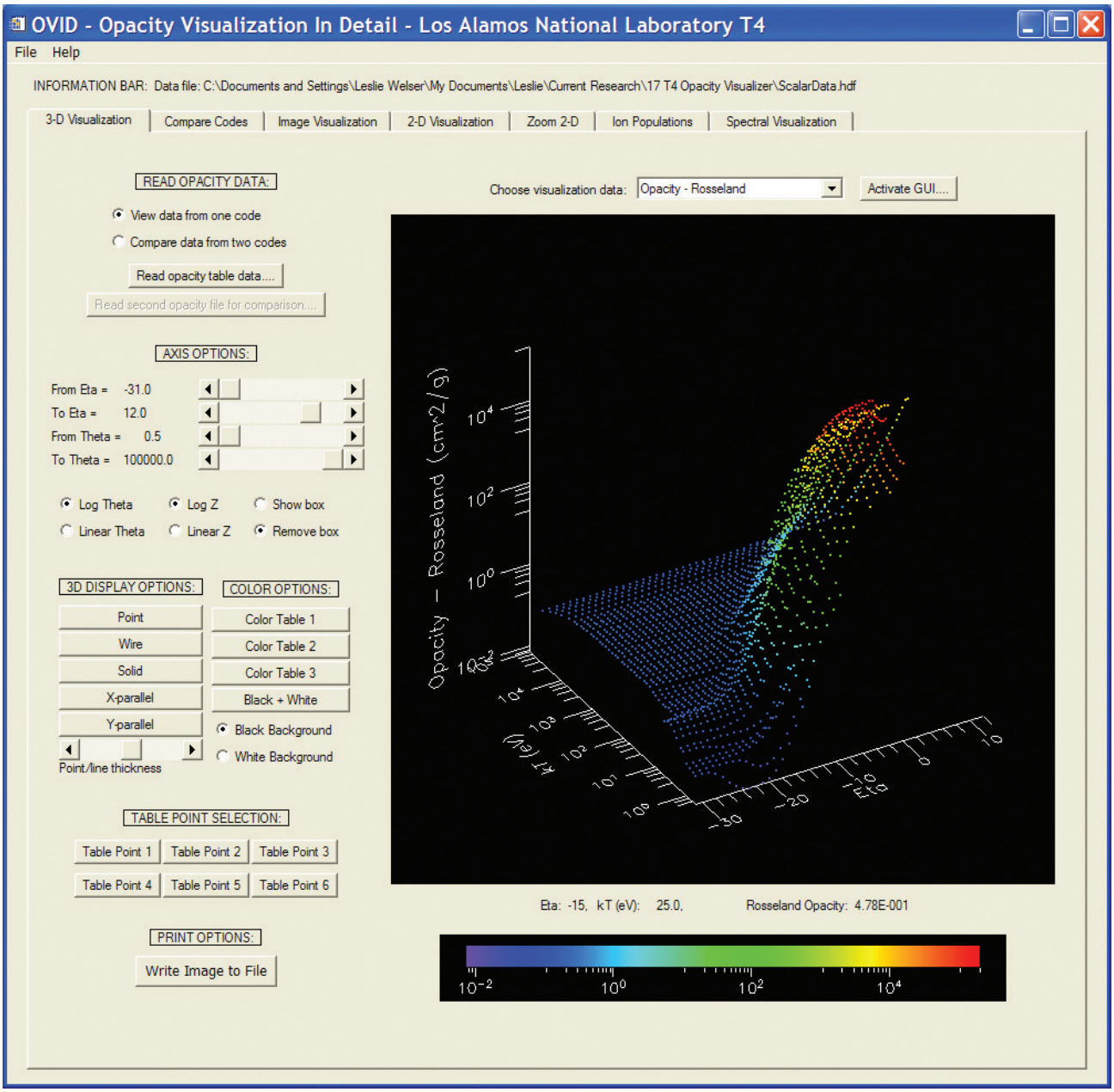

Fig. 1.
An example of OVID's main window and a Rosseland opacity 3-D surface from an ATOMIC code runs for oxygen.